Catalogue of American Amphibians and Reptiles.

Villa, Jaime D. 1988. *Rana vibicaria.*

Rana vibicaria (Cope)
Rana Montañera

Levirana vibicaria Cope, 1894:197. Type-localities, "Rancho Redondo on the divide of the Irazu Range [2048 m, San José Province], Costa Rica"; and "Isla Nueva near the head of the Rio Sucio on the Atlantic side [Cartago Province, Costa Rica, *fide* Savage 1974]". Lectotype (designated by Zweifel [1964]), American Museum of Natural History 5463 (from Rancho Re dondo), collected by George K. Cherrie on 20 August 1893 (not examined by author).

Rana godmani Günther, 1900:204. Type-locality, "Costa Rica, Rio Sucio [1900-2000 m, Cartago Province], Costa Rica". Collected by C. F. Underwood (date not given). Syntypes, British Museum of Natural History: 1947.2.28.18 (adult female) (examined by author).

Rana vibicaria: Dunn, 1922:221.

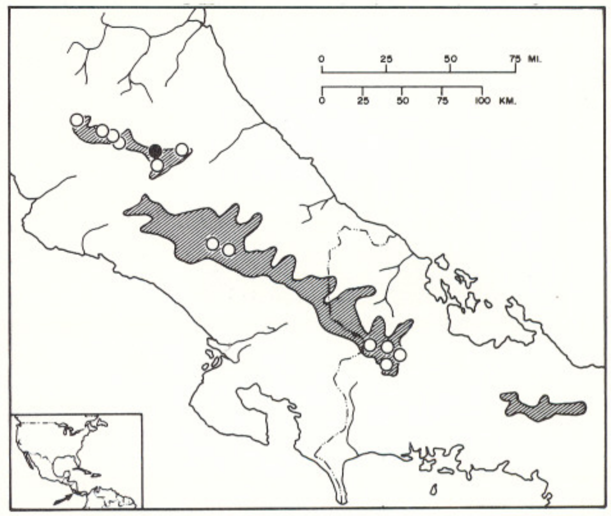
• **Definition**. *Rana vibicaria* is a member of the *palmipes* species group (Hillis, 1985; Hillis and de Sá, 1988). It is a moderately large species; recently metamorphosed individuals measure 26-35 mm, adult males are 62-72 mm, and females attain 80 mm in snout-vent length. The snout is short and wide with the interorbital area wider than the eyelid. The tongue is deeply notched behind. Vocal sacs and slits are absent; males lack Müllerian ducts. The dorsolateral folds are flat, broad and glandular, continuous to the groin and bordered by black pigment. The tympanum is distinct, slightly larger in males. A supralabial light stripe is present. The dorsal skin is smooth, sometimes slightly tuberculate. The toe tips are greatly expanded, and the webbing of the feet is reduced. There are two metatarsal tubercles on each foot. The sacral and presacral vertebrae are fused.

The adult coloration is variable. Some individuals are bright green dorsally with small dark brown spots bordered by gold; a narrow golden line runs above the brown dorsolateral fold. The flanks are yellowish-green and the light stripe along the upper lip is greenish-gold. The iris is green. The canthal region is brown, this color passing over the tympanum to join the brown edging of the dorsolateral fold. The limbs are green dorsally with some brown and gold speckling; the axilla, groin, posterior lower surfaces of the thighs, and the undersides of the fore and hind feet are pink to orange-red. Other individuals are brassy-brown, with the lateral half of the dorsolateral fold yellowish-brown, bordered below by a faint, diffuse dark streak. The flanks are yellowish-brown. The upper lip is about the same color as the lateral part of the fold, with an ill-defined dark streak along the canthus continuing over and behind the tympanum. Dorsally the limbs are yellowish-brown.

The larvae are brown without a definite pattern; the larger ones have an olive ground-color and conspicuous dark spotting. The mouth is relatively small with the disc 33-40% of the width of the body. The papillary border is complete except for a gap above the beak, and is clearly indented laterally. There is a single row of uninterrupted denticles followed by 4 rows divided by the upper beak. The first lower row is also interrupted, followed by a maximum of 3 uninterrupted rows.

• **Diagnosis.** Adults can be distinguished from other Middle American ranids by their brown to green unblotched dorsum, black face mask, white supralabial stripe and dorsolateral fold margins, orange to reddish ventral limb surfaces, distinct tympanum (smaller than the eye), two metatarsal tubercles, broadly expanded toe tips and extensive toe webbing. Tadpoles lack marginal teeth, have an emarginate oral disk, and a denticle formula of 5-6(2-6)/4(1).

• **Descriptions.** Detailed descriptions were given by Boulenger (1920), Cope (1894), Günther (1900), and Taylor (1952). Dunn (1922) briefly described the tadpole. Greding (1964) described vocalization. Zweifel (1964) added information from a Panamanian population describing color in life, habitat, mating calls, eggs, and larvae.



Map. Solid circle indicates the type-locality. Open circles indicate other localities. Modified from Zweifel (1964).

• **Illustrations**. Günther (1900) provided excellent illustrations of the dorsal aspect of the body and lateral aspect of the head of a preserved specimen (as *Rana godmani*) which were copied by Taylor (1952). Zweifel (1964) illustrated a living male and female specimen from Panama, a spectrogram of the mating call, larvae in four stages of development, and the fully developed mouthparts. A color photograph of a living individual from Monteverde, Costa Rica is in Hillis and de Sá (1988).

• **Distribution**. *Rana vibicaria* has a disjunct highland distribution, between 1500 and 2100 m above sea level in the Cordillera de Tilarán and the Cordillera Central of Costa Rica southeast to Volcán Chiriquí in Panama. It is a forest-floor species which congregates to breed in more or less permanent bodies of water (Scott and Limerick, 1983), either ponds or slow moving streams.

Adult individuals in one population I studied near the crater of the Volcán Irazú, Costa Rica, were active during the day and deposited submerged egg masses in shallow water, attached to vegetation and rocks. They were so docile they could be touched or collected and made no effort to escape.

• **Fossil Record**. None.

• **Pertinent Literature**. Zweifel (1964) gave the most recent and extensive discussion of the taxonomy, life history and distribution of the species. Hillis and Davis (1986) and Hillis and de Sá (1988) reviewed the systematics of New World species of *Rana* and and the *R. palmipes* group respectively, and considered *vibicaria* to be most closely related to *R. warszewitschii* as Zweifel (1964) had earlier suggested. Greding (1964) compared the call of *vibicaria* with those of other Central American *Rana*. Savage (1974) gave details about the type localities of *R. godmani* and *R. vibicaria.* The species has been included in checklists for Middle America (Villa et al., 1988) and Costa Rica (Savage and Villa, 1986).

• **Nomenclatural History**. Cope (1894) described the species and placed it in the new genus, *Levirana,* distinguished from *Ranula (= Rana)* solely by the absence of vomerine teeth. Dunn (1922) assigned it to the genus *Rana* without comment, a decision that Zweifel (1964) and subsequent authors upheld on the basis of the instability of the diagnostic character. Günther (1900) described *Rana godmani,* having been misled by minor differences and errors

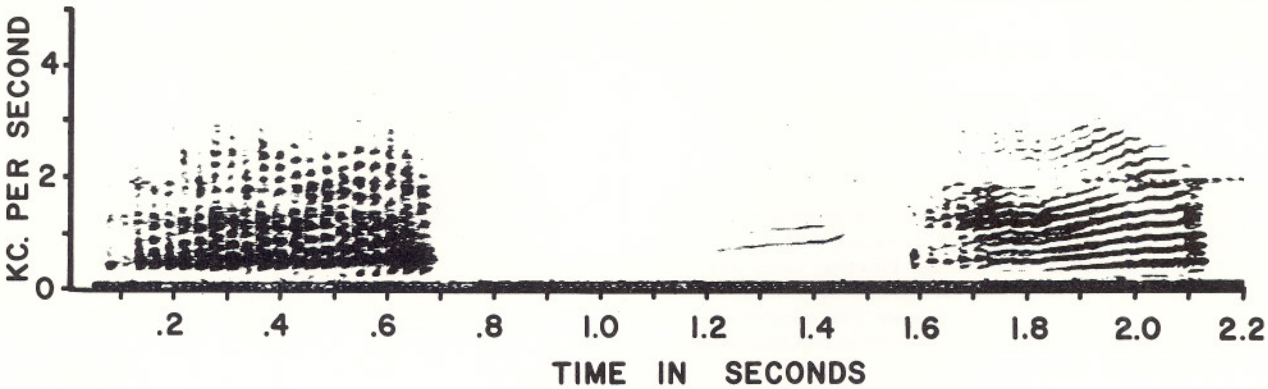


Figure. Sound spectrogram of a mating call of *Rana vibicaria* from Cerro Punta, Chiriquí Province, Panama. Surface water temperature was 20.2°C. Left: trilled call, right, untrilled. Courtesy of Richard G. Zweifel.

in the original description of *vibicaria,* but Boulenger (1920), Dunn (1922), and subsequent authors considered the two species synonymous.

• **Etymology**. Not stated in the type description or elsewhere by Cope, but the name was apparently derived from the Latin *vibicis* (the mark of a whip, a weal) in reference to the strongly demarcated dorsolateral folds typical of this species.

Literature Cited

Boulenger, George Albert. 1920. A monograph of the American frogs of the genus *Rana*. Proc. Amer. Acad. Arts Sci. 55(9):413-480.

Cope, Edward Drinker. 1894. Third addition to a knowledge of the Batrachia and Reptilia of Costa Rica. Proc. Acad. Natur. Sci. Philadelphia1894:194-206.

Dunn, Emmett Reid. 1922. Notes on some tropical ranae. Proc. Biol. Soc. Washington 35:221-222.

Greding, E. J., Jr. 1972. Call specificity and hybrid compatibility between *Rana pipiens* and three other *Rana* species in Central America. Copeia 1972(2):383-385.

Günther, Albert C. L. G. 1885-1902. Reptilia and Batrachia. p. xx +326 *In* F. D. Godman and O. Salvin, Biologia Centrali-Americana. Dulau and Co., London.

Hillis, David M. 1985. Evolutionary genetics and systematics of New World frogs of the genus *Rana:* an analysis of ribosomal DNA, allozymes, and morphology. Ph.D. thesis, Univ. Kansas. Lawrence. 304 p.

——, and Scott K. Davis. 1986. Evolution of ribosomal DNA: Fifty million years of recorded history in the frog genus *Rana*. Evolution 40(6):1275-1288.

——, and Rafael de Sá. 1988. Phylogeny and taxonomy of the *Rana palmipes* group (Salientia: Ranidae). Herpetol. Monogr. 2: 1-26.

Savage, Jay M. 1974. Type localities for species of amphibians and reptiles described from Costa Rica. Rev. Biol. Trop. 22(1):71-122.

——, and Jaime Villa R. 1986. Introduction to the herpetofauna of Costa Rica. Soc. Stud. Amph. Rept. Contrib. Herpetol. No. 3, 206 pp.

Scott, Norman J. and S. Limerick. 1983. Reptiles and amphibians, pp. 351-367 *In* D. H. Janzen, (Ed.), Costa Rican Natural History. Univ. Chicago Press, Chicago and London. 816 p.

Taylor, Edward H. 1952. A review of the frogs and toads of Costa Rica. Univ. Kansas Sci. Bull. 35(5):577-942.

Villa, Jaime, Larry D. Wilson and Jerry D. Johnson. 1988. Middle American herpetology. A bibliographic check list. Univ. Missouri Press, Columbia. xxxvi+132p.

Zweifel, Richard G. 1964. Distribution and life history of a Central American frog, *Rana vibicaria*. Copeia 1964(2):300-308.

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